E74-10483
CR-136879

ERTS DATA USER TYPE-1 PROGRESS REPORT FOR JANUARY/FEBRUARY 1974

Project Title/Objective: Relevance of ERTS to the State of Ohio

Proposal Number: MMC No. 87

Contract Number: NAS5-21782

BCL Subcontract Number: 72-17/G-1793

Principal Investigator: Dr. David C. Sweet

I. DATA COLLECTION

ERTS-1 data received from NASA during this reporting period are summarized in Table 1. In addition to the imagery described in the Table, computer compatible tape data have also been received for most of these same scenes. Figure 1 illustrates the present status of all usable repetitive ERTS imagery of the various portions of Ohio. Many of the multispectral color composites that have been requested for most of the usable ERTS scenes of Ohio have also been received.

No more aircraft or ground truth study site data collection activities were conducted during this reporting period.

II. DATA ANALYSIS

No major analytical activities were conducted during this reporting period. However, program activities focused on the preparation of demonstration and display products illustrating the potential usefulness of ERTS data to multidisciplinary and multiagency interests and activities in Ohio. These items were prepared primarily for use during the Ohio ERTS/Skylab Data User Workshop.

III. DCS/DCP EFFORT

As stated in previous progress reports, use of the Ohio-ERTS DCP has been discontinued. A one page information sheet entitled "Ohio-ERTS Data

(E74-10483) RELEASE OF ERTS TO THE STATE OF OHIO Progress Report, Jan. - Feb. 1974 (Ohio Dept. of Economic and Community) 14 p HC $4.00 CSCL 08F

N74-22007

Unclas
G3/13 00483

TABLE 1. COVERAGE AND QUALITY OF ERTS-1 DATA OVER OHIO RECEIVED DURING THIS REPORTING PERIOD

Date	Time		Quality Comments*
		TRACE 1	
11/14/73	15333	NE Ohio and Western Lake Erie	Good
12/2/73	15332	NE Ohio and Western Lake Erie	Excellent
12/2/73	15335	Eastern Ohio and Western Pa.	Excellent
12/2/73	15341	SE Ohio and West Virginia	Excellent
1/25/74	15320	NE Ohio and Western Lake Erie	Excellent
1/25/74	15322	Eastern Ohio and Western Pa.	Good
1/25/74	15325	SE Ohio and West Virginia	Good
		TRACE 2	
9/22/73	15404	NE Ohio, Lake Erie, and Canada	Poor
9/22/73	15410	Columbus and Eastern Ohio	Poor
9/22/73	15412	SE Ohio	Poor
12/3/73	15391	NE Ohio, Lake Erie, and Canada	Excellent
12/3/73	15393	Columbus and Eastern Ohio	Excellent
12/3/73	15400	SE Ohio	Excellent
1/8/74	15382	NE Ohio, Lake Erie, and Canada	Good
1/8/74	15384	Columbus and Eastern Ohio	Good
1/26/74	15374	NE Ohio, Lake Erie, and Canada	Poor
		TRACE-3	
12/22/73	15443	NW Ohio and Lake Erie	Poor
12/22/73	15450	Columbus and Western Ohio	Poor
12/22/73	15452	SW Ohio, Indiana, and Kentucky	Poor
		TRACE 4	
9/6/73	15520	NW Ohio, Michigan, and Indiana	Good
9/6/73	15523	Western Ohio and Eastern Indiana	Poor
9/6/73	15525	SW Ohio, Indiana, and Kentucky	Poor
11/17/73	15505	NW Ohio, Michigan, and Indiana	Very Good
11/17/73	15511	Western Ohio and Eastern Indiana	Very Good
11/17/73	15514	SW Ohio, Indiana, and Kentucky	Very Good
1/28/74	15495	SW Ohio, Indiana, and Kentucky	Very Poor

* Quality related to general cloud cover condition over area covered by satellite photography.

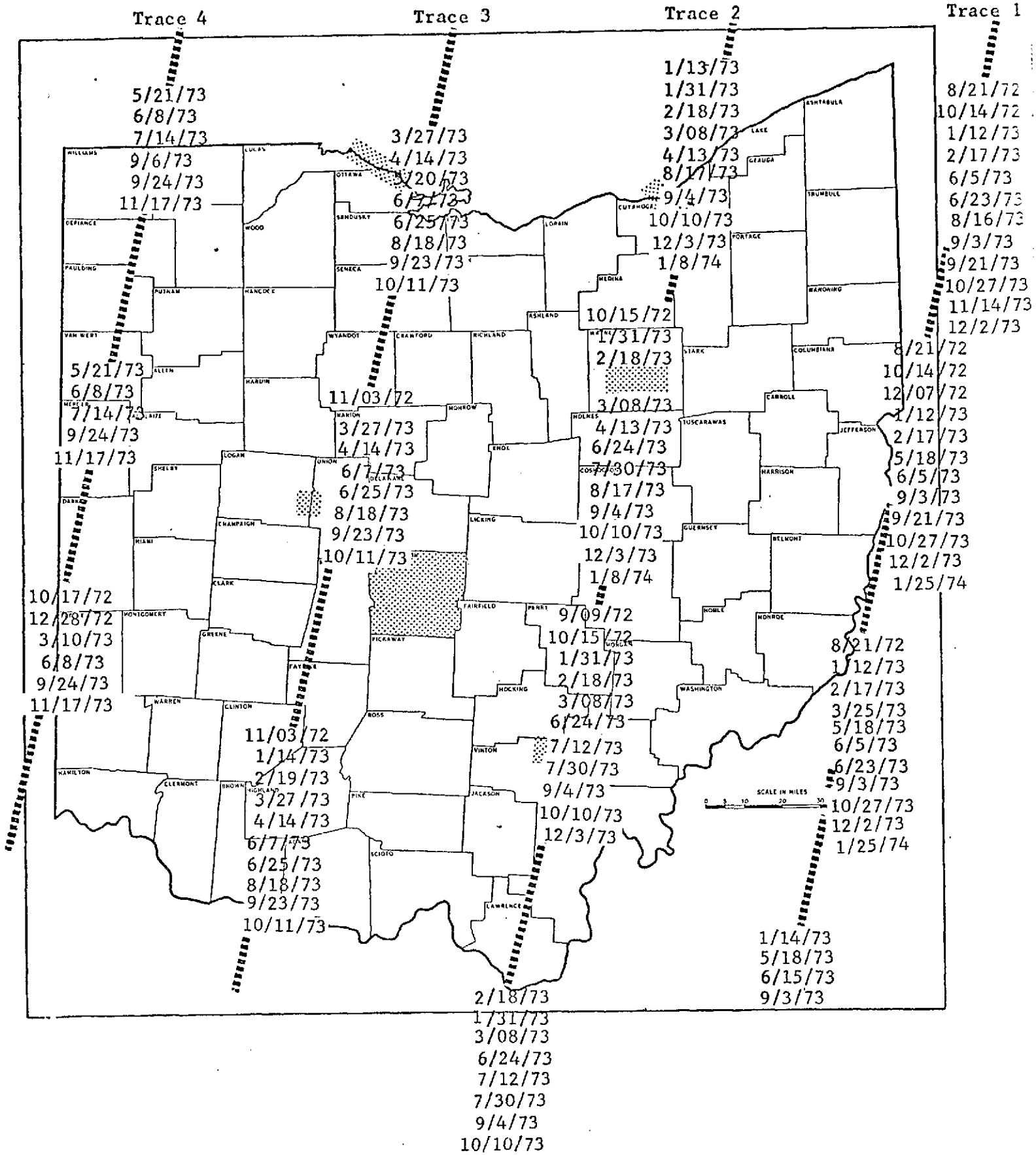


Fig. 1. Status of Usable Repetitive ERTS Imagery for Ohio

Collection System Experiment" which briefly describes and summarizes the results of this demonstration experiment in Ohio, was prepared and distributed to various potential state-user personnel. This summary is included in the attachments to this report.

IV. DATA UTILITY ASSESSMENT

During this reporting period continuing attention was given to testing the usefulness of ERTS imagery to individual programs and interests within various agencies. Another fifty visitors toured the Remote Sensing Application Laboratory during January and February where Battelle and State personnel jointly analyzed ERTS data in regard to a variety of State data needs.

The major program activities of this reporting period focused on the organization of and preparation for the Data User Workshop held on March 4-5, 1974. The principal purpose of this two-day workshop was to present the significant results of the Ohio ERTS and Skylab programs to date and to provide an assessment of the utility of satellite survey data to problem areas at the local, regional, and state levels in Ohio. The workshop agenda, news release, and fact sheet have been included as attachments to this report. Over 100 persons attended various sessions of the two-day workshop and final evaluations and recommendations derived from this workshop are being analyzed and will be presented in the final Type III report. The Ohio Department of Economic and Community Development is planning to publish the proceedings of the Workshop.

V. SIGNIFICANT RESULTS

There were no significant program results this reporting period.

VI. MISCELLANEOUS

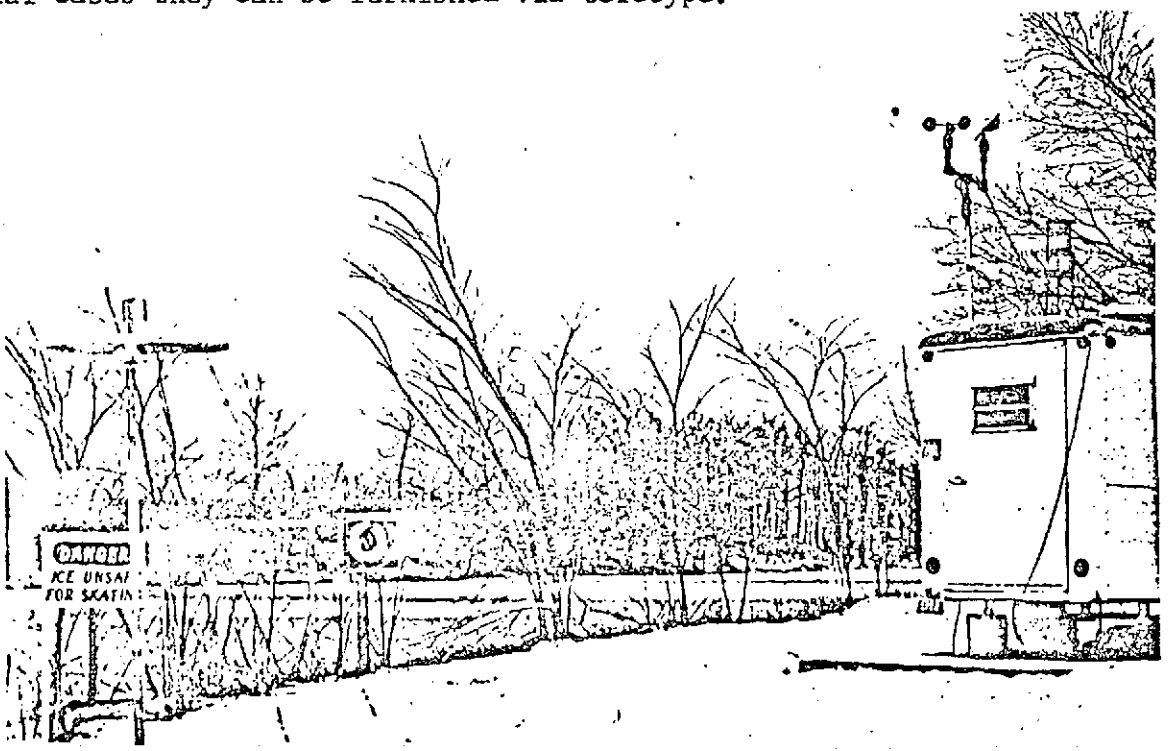
The Ohio ERTS/Skylab earth resources survey programs will be the subject of a paper which will be presented at the Ninth International Symposium on Remote Sensing of Environment by State of Ohio and Battelle Personnel scheduled to be held on April 15-19, 1974 in Ann Arbor, Michigan. A summary of the paper entitled "Multidisciplinary Applications of ERTS and Skylab Data in Ohio" has been included as an attachment to this report.

OHIO-ERTS DATA COLLECTION SYSTEM EXPERIMENT

In addition to its remote sensing functions, ERTS-1 serves in a Data Collection System (DCS) which permits environmental data collected at remote sites to be automatically transmitted by Data Collection Platforms (DCPs) for relay by the satellite to one of the NASA ground receiving sites. From there the data are forwarded to the NASA Data Processing Facility and thence to the user agency. Well over a hundred of these platforms are in the field at sites extending from the Arctic to the tropics. The cost of a single DCP is approximately $2500.

A single DCP, located at Battelle's West Jefferson, Ohio, facility, has been used in the Ohio-ERTS program to demonstrate the utility of the DCS for potential state use in an operational mode. The platform was installed in December, 1972, and operated until late July, 1973, except for one outage due to lightning damage. The platform has been interfaced with a Schneider Model RM 25 Robot Monitor, which senses seven water quality and two meteorological parameters.

Although the satellite retraces its path over a given DCP site only once every 18 days, DCP transmissions (which occur at 3 minute intervals) are relayed whenever the platform and a ground receiving site are in mutual radio view of the satellite. Depending upon its location, data from a DCP may be relayed several times a day, which was true with the Ohio ERTS platform. The data are processed and distributed by mail, normally in either IBM card, computer print-out (received in the Ohio-ERTS program), or magnetic tape format. In special cases they can be furnished via teletype.



Attachment 2

AGENDA
OHIO ERTS/SKYLAB DATA USER WORKSHOP

Stouffers University Inn
3025 Olentangy River Road
Columbus, Ohio 43202

March 4-5, 1974
9:00 A.M. - 3:30 P.M.

Monday, March 4, 1974

PLENARY SESSION - Moderator - Larry L. Long, Chief, Bureau of Land Use Planning, DECD

9:00 A.M. Introduction and Welcome - David C. Sweet, Director of the Ohio Department of Economic and Community Development

Skylab and ERTS Films - NASA

Coffee Break

ERTS Background and Status - NASA Representative (Fred Gordon and Dr. Herman Mark)

Skylab Background and Status - NASA Representative (James Powers)

Ohio Satellite Program Summary - Paul Pincura, ERTS/Skylab Coordinator, DECD

Battelle Program Involvement - George E. Wukelic, Battelle Columbus Laboratories

11:30 A.M. Lunch

1:00 P.M. Air and Water Applications - George B. Garrett, Ohio Environmental Protection Agency

Surface Mining Reclamation Implications and Smoke Plume Detection - Wayne Pettyjohn, Ohio State University

Natural Resource Applications with Emphasis on Strip Mining - Clemens J. Meier, Department of Natural Resources

Land Use Applications - Terry Wells, Department of Natural Resources

Coffee Break

Transportation Applications - Lloyd O. Herd, Ohio Department of Transportation

Forestry and Vegetation Applications - Dennis Anderson, Ohio Biological Survey

Applications for Agriculture - James Dowdy, Ohio State University

Orbital Survey Data Operational Implications - Richard C. Gerhan, Baldwin-Wallace College

3:15 P.M. Local User Comments - Paul Baldridge, Columbus Department of Community Development; Ray Kuchling, Mid-Ohio Regional Planning Commission; David Hinson, Soil Conservation Service

Tuesday, March 5, 1974

LABORATORY PROBLEM-SOLVING SESSIONS - Note: Laboratory equipment designed to enhance satellite imagery will be present along with corresponding data to provide workshop participants an opportunity to apply ERTS/Skylab data to their regions and discipline interests.

9:00 A.M. Discipline Applications - Water Resources, Land Use, Forestry/Agriculture, Environmental Quality, and Mapping.

10:00 A.M. Functional Applications - Planning, Policy Formulation, and Legislation *

10:45 A.M. Area Analysis - Local Regional, and State *

11:30 A.M. Lunch

1:00 P.M. Utility Evaluation Sessions - Paul Pincura, DECD; George Wukelic, BCL

Open Discussion and Comment Upon Data Utility - Workshop participants

*Sessions will be conducted in concert with DECD and Battelle personnel.

Office of Communications

John Mountain (614) 466-2609
Home (614) 875-3360

Paul Richards (614) 466-3095
Home (614) 279-7753

FOR IMMEDIATE RELEASE:

COLUMBUS, MARCH 1--The potential state, regional, and local uses of the NASA Earth Resources Technology Satellite (ERTS) and Skylab data will be the topic of a workshop to be held March 4 and 5 in Columbus.

The workshop, sponsored jointly by the Ohio Department of Economic and Community Development and Battelle's Columbus Laboratories, will be held at Stouffers University Inn, Olentangy River Rd.

Major objectives of the workshop are to broaden potential user awareness of the nature and availability of the Ohio satellite data and to undertake a comprehensive evaluation of its potential statewide use.

For the past 18 months the Department of Economic and Community Development has been leading a multiagency and multidisciplinary study of possible future operational uses of experimental ERTS and Skylab data currently being acquired on Ohio in the areas of environmental quality, land-use planning and resource management. The study is funded by NASA.

Battelle, which is assisting the state in the laboratory analysis of the ERTS and Skylab photographs, will provide the necessary equipment to make workshop studies of satellite data use possible.

According to Dr. David C. Sweet, development department director and principal investigator for both NASA programs, the workshop's opening day activities will provide background information and brief statements of potential ERTS and Skylab data applications.

--more--

On the second day workshop participants will have an opportunity to discuss potential public and private sector benefits of such satellite survey data. Also on the second day "participant suggested" problem-solving experiments will be conducted in which Ohio ERTS and Skylab photographs will be analyzed in association with existing air and water quality, surface mining, land use, transportation, agriculture, and mapping problems.

Sweet said his department expects more than 100 invited participants from the public and private sectors to attend the two-day, free session in Columbus. Agencies participating in the workshop include the Departments of Natural Resources, Transportation, Department of Economic and Community Development; Environmental Protection Agency; Ohio State University; Battelle; Ohio Biological Survey; NASA Lewis Research Center; and Baldwin Wallace College.

--30--

STATE OF OHIO
DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT
MARCH 1, 1974
03-062

ACCOMPANYING MATERIAL

Attachment 2

FACT SHEET

OHIO-ERTS/SKYLAB DATA USER WORKSHOP - MARCH 4-5, 1974

Since 1972, the state of Ohio has been participating in two NASA programs designed to benefit Ohio citizens by studying how satellite data can be used to inventory and manage the state's natural and cultural resources.

These on-going multiagency and multidisciplinary programs involve studies of the potential value of satellite photography of Ohio which have been automatically and repetitively (every 18 days) acquired by the first Earth Resources Technology Satellite (ERTS-1) since July, 1972, and the more precise and sophisticated photographs taken over selected portions of Ohio by astronauts during the three recent manned Skylab missions.

According to Dr. David C. Sweet, director of the Department of Economic and Community Development (Lead Agency) and principal investigator of both the ERTS and Skylab programs, participating state agencies, assisted by Battelle's Columbus Laboratories, have clearly identified and demonstrated several significant uses of such data in Ohio's environmental quality, land use planning, and resource management activities. However, Sweet said numerous other application possibilities remain unexamined.

In order to profit from the experience of individuals from organizations throughout the state which are confronted every day with environmental and resource management problems, the Department of Economic and Community Development and Battelle's Columbus Laboratories have planned a statewide ERTS/Skylab Data User Workshop at Stouffers University Inn, Columbus, Ohio on March 4-5, 1974.

Representatives from nearly every facet of Ohio environmental protection, resource management, and land use planning, including planners and officials from state agencies, regional planning organizations, and local planning and policy agencies, have been invited to participate in the two-day workshop. The objectives of the workshop are: 1) to review potential uses of Ohio satellite data established to date and 2) to test the appropriateness of the data to particular problem-solving interests and needs of the

The opening session on March 4 will treat the status of efforts to use ERTS and Skylab data in Ohio and other states and countries. Speakers include Sweet; George Mukelic of Battelle; Paul Pincura, Ohio ERTS/Skylab Coordinator; Fred Gordon of NASA's Goddard Space Flight Center; and Dr. Herman Mark of NASA Lewis Research Center. Larry Long of the development department will serve as session moderator.

In the afternoon, the following representatives of major potential user agencies will summarize their views as to satellite survey data application possibilities.

*Mr. George Garrett of the Ohio Environmental Protection Agency will discuss the air and water quality implications especially in relation to modeling and managing Lake Erie processes.

*Prof. Wayne Pettyjohn of OSU (another ERTS-1 principal investigator) will highlight his independent findings for using satellite data for strip mining reclamation activities.

*Mr. Clemens Meier and Mr. Terry Wells of the Ohio Department of Natural Resources will discuss natural resources and land use application of satellite data respectively.

*Mr. Lloyd Herd of the Ohio Department of Transportation will relate the department's interests in applying satellite data to transportation planning and mapping activities.

*Mr. Dennis Anderson of the Ohio Biological Survey and Mr. James Dowdy of OSU will discuss forestry and agricultural applications.

*Prof. Richard Gerhan of Baldwin Wallace College will address the state-level operational implications of satellite survey data.

Second day workshop activities will include informal exchanges on the value to the private and public sector of satellite data applications identified to date on problem-solving experiments in which workshop participants will have an opportunity to examine Ohio satellite data in relation to their specific discipline or geographic area of interest. Joe Stephan, Harry Smail, and Tom Ebbert of Battelle will assist participants in the operation of the specialized photographic equipment provided at the workshop for conducting the data analysis experiments.

Ohio has received more than 100 usable ERTS-1 photographs showing all areas during most seasonal variations. Higher resolution Skylab imagery is limited mostly to Cleveland, Columbus, and eastern and southeastern Ohio areas and has only recently become available.

In addition to the satellite photographs, an extensive collection of recent aerial photography acquired to support these programs is available for selected areas of Ohio to qualified user groups.

--30--

Attachment 3

MULTIDISCIPLINARY APPLICATIONS OF ERTS AND SKYLAB DATA IN OHIO*

D. C. Sweet(1), P. G. Pincura(1),
C. J. Meier(2), G. B. Garrett(3), L. O. Herd(4),
J. M. Dowdy(5), D. M. Anderson(6)

State Government of Ohio

G. E. Wukelic, J. G. Stephan,
H. E. Smail, and T. F. Ebbert

Battelle, Columbus Laboratories
Columbus, Ohio

SUMMARY

Since July, 1972, the State Government of Ohio in conjunction with Battelle's Columbus Laboratories, and with funding assistance from NASA has been involved in a multidisciplined and multiagency study of the state-level utility of ERTS-1 and Skylab data. This study involves (1) user awareness, (2) application analyses and demonstration, and (3) utility assessment functions.

User awareness efforts have focused on interacting with the hundreds of government planners, educators, researchers, and decision makers that represent potential users of satellite earth resources survey data. Active participation by way of Laboratory visitations was extensively encouraged and was highly successful in that it provided a mechanism for linking current problems and programs with recently acquired satellite data. Passive, but less effective, techniques included preparation of "Ohio-ERTS Data Users Handbook", formal presentations at potential user agencies, and press releases for promoting general ERTS/Skylab data awareness throughout the public sector, including industry.

Application analyses and demonstration efforts have accounted for the majority of efforts expended to date and involve correlative satellite, aircraft, and on-site data analysis using manual and machine-assisted techniques. Positive results have been achieved and documented in the disciplines of environmental quality, land-use planning, and resource management.

Although major smoke plumes are discernible and are being looked at for state air quality modeling implications, most promising environmental quality data use candidates relate to land quality (surface mining inventorying and monitoring) and water quality (Lake Erie modeling) applications.

For land use, available satellite data are more than adequate for seasonally mapping and inventorying major natural and cultural surface features at scales of 1:24,000 and smaller and at less cost and with better accuracies than with previous techniques. Efforts to date have demonstrated the types of ERTS and Skylab data analysis techniques and products that can be performed operationally for solving land-use problems, for general land-use planning, and for meeting the longer range requirements of the pending National Land Use Policy Act.

An example of satellite data use in inventorying resources was the generation of a thematic transparency of mature forested areas in southeast Ohio in excess of 25 acres. The transparency clearly illustrates the significant changes that have occurred in Ohio's forestry resources since 1968 (when compared to 1:250,000 topographic map). For selected study-site areas, the transparency is over 95 percent accurate, and although the accuracy has not as yet been determined in extrapolated regions, it appears comparable to the USGS 1:24,000 maps and more accurate than the 1:250,000, especially for urbanized areas.

* Summary of this paper to be presented at Ninth International Symposium on Remote Sensing of Environment, Ann Arbor, Michigan, April 15-19, 1974.

Other possible data uses, such as lake ice monitoring, transportation planning, floodplain monitoring, and educational and communications implications are under study.

Utility assessment efforts range from individual state agency personnel judgements resulting from in-the-laboratory evaluation of problem-solving usefulness of available satellite data to group opinions formulated at a recently held 2-day statewide "Ohio ERTS/Skylab Data User Workshop". The latter was successful in its purpose of broadening user group participation in assessing the value of all potential application candidates.

---

(1) Department of Economic and Community Development.
(2) Department of Natural Resources.
(3) Ohio Environmental Protection Agency.
(4) Department of Transportation.
(5) The Ohio State University.
(6) Ohio Biological Survey.